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(71) Applicant: SEIKOSHA CO. LTD.
(72) Inventor: AMAKASU Mikio
(74) Agent: MATSUDA Kazuko, Patent Attorney

(54) [Title of the Invention] **Electrically powered toothbrush**

[Claims]

[Claim 1] An electrically powered toothbrush comprising:

a drive motor housed within a case and selectively operatable in forward and reverse;

a motion conversion device for converting rotational motion of said drive motor into reciprocating motion;

a first drive shaft housed within said case, supported displaceably in the axial direction of said case, and extending from said motion conversion device to a top opening of said case;

a brush head coupled to the distal end of said first drive shaft and projecting out through said top opening of said case;

a rotary brush rotatably provided at the distal end of said brush head;

a pinion for driving rotation of said rotary brush;

an arm having at the distal end thereof a rack meshing with said pinion, and supported displaceably in the axial direction within said brush head; and

a second drive shaft coupled with the back end of said arm and linked with said motion conversion device, and supported within said case so as to be displaceable in the axial direction of said case;

wherein said motion conversion device comprises a clutch mechanism having a first eccentric cam and a second eccentric cam that, by means of switching the direction of rotation of said drive motor, are selectively driven with reference to [operation of] said first drive shaft and said second drive shaft.

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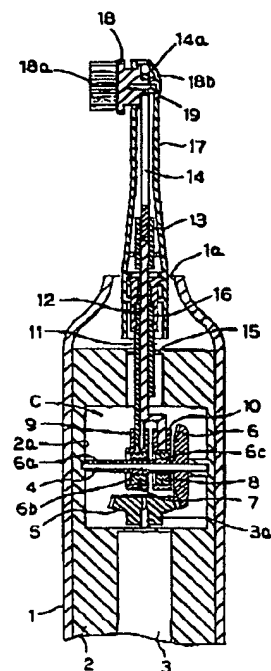
(74) 代理人 弁理士 松田 和子

(54) 【発明の名称】 電動歯ブラシ

(57) 【要約】

【目的】 電動歯ブラシの駆動モータの回転方向を切換えることにより、歯の部位に応じた歯磨き動作を切換え可能にする。

【構成】 ケース1内部に駆動モータ3と、運動変換装置Cとを設ける。運動変換装置Cにより駆動モータ3の回転をモータピニオン5、傘歯車6を介してスリーブ6aに伝達し、モータの回転方向に従って、ラチェット車6b、ラチェット爪を介して第1駆動軸11の、またはラチェット車6c、ラチェット爪を介して第2駆動軸12の往復運動に変換する。第1駆動軸11にブラシ体17を連結し、第2駆動軸12にアーム14を連結し、アーム14のラック14aに回転ブラシ体18のピニオン18bを噛合する。回転ブラシ体18に設けた歯ブラシ18aは、上下往復運動と回転往復運動とを共に行う場合と、回転往復運動のみの場合とに切換えられる。



PATENT ABSTRACTS OF JAPAN

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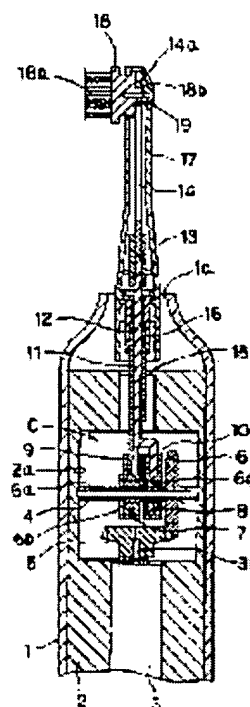
(72)Inventor : AMAKASU MIKIO

(54) ELECTRIC TOOTHBRUSH

(57)Abstract:

PURPOSE: To select a brushing motion depending on the section of teeth by changing over the rotational direction of a drive motor for an electric tooth brush.

CONSTITUTION: A case 1 is internally provided with a drive motor 3 and a motion conversion device C. The rotation of the motor 3 is transmitted to a sleeve 6a via a motor pinion 5 and a bevel gear 6 on the operation of the device C. The rotation of the motor 3 is, then, converted to the reciprocating motion of the first drive shaft 11 via a ratchet gear 6b and a ratchet tooth, or of the second drive shaft 12 via a ratchet gear 6c and the ratchet tooth, according to a motor rotating direction. Also, a brush body 17 is jointed to the shaft 11, while an arm 14 to the shaft 12. Then, the pinion 18b of a rotary brush body 18 is made to gear with the rack 14a of the arm 14. As a result, a toothbrush 18a fitted to the rotary brush body 18 can be selected between the case of vertical and rotary reciprocating motion, and the case of only the rotary reciprocating motion.



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CLAIMS

[Claim(s)]

[Claim 1] Alternatively [have prepared in the interior of a case and] The drive motor in which forward inverse rotation is possible, The 1st driving shaft which it is supported free [migration to the shaft orientations of the case concerned] the movement inverter which changes rotation of the above-mentioned drive motor into a reciprocating motion, and inside the above-mentioned case, and is extended from the above-mentioned movement inverter to upper limit opening of the above-mentioned case, The brush object which connects at the tip of the 1st driving shaft of the above, and projects from upper limit opening of the above-mentioned case, The rotation brush object established at the tip of the above-mentioned brush object free [rotation], and the pinion for carrying out the rotation drive of the above-mentioned rotation brush object, The arm which has prepared the rack which gears with the above-mentioned pinion at the tip, and was supported free [migration to shaft orientations] inside the above-mentioned brush object, It connects with the back end of the above-mentioned arm, and it has formed successively to the above-mentioned movement inverter, and has the 2nd driving shaft currently supported free [migration to the shaft orientations of the case concerned] inside the above-mentioned case. The above-mentioned movement inverter The electric toothbrush characterized by equipping the clutch device in which it has the 1st eccentric cam and the 2nd eccentric cam which are alternatively driven corresponding to the 1st driving shaft of the above, and the 2nd driving shaft by the change of the above-mentioned drive motor rotation direction.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to an electric toothbrush.

[0002]

[Description of the Prior Art] From the former, various things are proposed about the electric toothbrush. There is a thing (bus polishing) which was made to carry out both-way rectilinear motion to shaft orientations by the motor which has prepared the brush object (part equivalent to the shank of the usual gear-tooth brush) which has the brush section at a tip in one of the typical things in the interior of a case, or a thing (rolling polishing) which was made to carry out both-way rocking movement at the circumference of a shaft also in it (for example, JP,61-64204,A). Moreover, there is some rolling polishing which was made to carry out both-way rotation of the bundle of a brush itself. There are what made adjustable the stroke of a reciprocating motion of the shaft orientations which give the bundle of a brush to what is fine-vibrated (SUKURAPPINGU polishing), and a brush, and many other things. And in the conventional electric toothbrush, what could be made to carry out change use of bus polishing, the rolling polishing, etc., respectively is known.

[0003]

[Problem(s) to be Solved by the Invention] However, although the conventional thing can carry out change use, the selected brushing-teeth method was single (bus polishing, rolling polishing, or SUKURAPPINGU polishing), and was not what can choose the brushing-teeth method which compounded these. Therefore, it was inadequate for being needed and carrying out toothbrushing according to the parts between gear teeth, and the gear tooth and gum which were constructed etc.

[0004] Then, the purpose of this invention is to enable it to choose compound polishing in the electric toothbrush which can switch toothbrushing actuation according to a dental part.

[0005]

[Means for Solving the Problem] Alternatively [have prepared the description of this invention in the interior of a case, and] The drive motor in which forward inverse rotation is possible, The 1st driving shaft which it is supported free [migration to the shaft orientations of this case] the movement inverter which changes rotation of a drive motor into a reciprocating motion, and inside the case, and is extended from a movement inverter to upper limit opening of a case, The brush object which connects at the tip of the 1st driving shaft and projects from upper limit opening of a case, The rotation brush object established at the tip of a brush object free [rotation], and the pinion for carrying out the rotation drive of the rotation brush object, The rack which gears with a pinion is prepared at the tip, and consists of an arm supported free [migration to shaft orientations] inside the brush object, and the 2nd driving shaft which connects with the back end of an arm, has formed successively to the movement inverter and is supported free [migration to the shaft orientations of the case concerned] inside the case. And the above-mentioned movement inverter is equipped with the clutch device in which it has the 1st eccentric cam and the 2nd eccentric cam which are alternatively driven corresponding to the 1st driving shaft and the 2nd driving shaft by the change of a drive motor rotation direction.

[0006]

[Example] Hereafter, one example of this invention is explained with reference to a drawing. As shown in drawing 1 - drawing 3, the drive motor 3 in which forward inverse rotation is possible is alternatively supported by the change of the forward inverse rotation circuit changing switch which is not illustrated inside the bell shape case 1 where it has upper limit opening 1a with a frame 2, and it has contained. A drive motor 3 uses as a drive power source the dry cell which is not illustrated. Room 2a which holds the below-mentioned drive inverter C is prepared in the frame 2, and motor shaft 3a of a motor 3 is projected in this room 2a in the direction of straight side (upper and lower sides) of the body case 1. The movement inverter C transforms rotation of a motor 3 to the straight-line reciprocating motion in alignment with the longitudinal direction of a case 1.

[0007] The movement inverter C is explained. The motor pinion 5 is fixed to motor shaft 3a which projects in room 2a. Bevel gear 6 mesh to this motor pinion 5, and these bevel gear 6 are supported free [rotation] on the shaft 4 with which room 2a is crossed and both ends are supported in the frame 2. Sleeve 6a is formed in bevel gear 6 in one, and this sleeve has fitted into a shaft 4 free [rotation].

[0008] 1st ratchet vehicle 6b with the dental reverse sense and 2nd ratchet vehicle 6c are mutually formed in sleeve 6a at one. As shown in drawing 4 and drawing 5, 1st ratchet vehicle 6b fitted in the centrum formed in the 1st eccentric cam 7, and 2nd ratchet vehicle 6c has fitted in the centrum formed in the 2nd eccentric cam 8. 1st ratchet pawl 7a with the reverse sense of a pawl and 2nd ratchet pawl 8a are mutually formed in the inner skin of the centrum of the 1st eccentric cam 7 and the 2nd eccentric cam 8 at one, respectively. The ratchet pawls 7a and 8a which can engage with these ratchet vehicles 6b and 6c and each ratchet vehicle constitute the clutch device D.

[0009] As shown in drawing 4, the 1st eccentric cam 7 has fitted in the long slot of the 1st cam follower 9 which has long slot 9a in which this periphery is inscribed, and the 1st driving shaft 11 in the air is fixed to the 1st cam follower 9. As shown in drawing 5, it has fitted in the long slot of the 2nd cam follower 10 which has long slot 10a by which this periphery is inscribed in the 2nd eccentric cam 8, and the 2nd driving shaft 12 is fixed to the 2nd cam follower 10. As shown in drawing 1, the 1st driving shaft 11 is supported free [migration to a longitudinal direction] through the bearing 15 prepared in the frame 2, and is extended near the upper limit opening 1a of a case 1 from the 1st cam follower 9.

Moreover, in the hollow of the 1st driving shaft 11, it penetrated free [sliding] in same axle, and the 2nd driving shaft 12 is projected from the 1st driving shaft.

[0010] The brush object 17 in the air is connected at the tip of the 1st driving shaft 11 free [attachment and detachment] through the attachment 16, and this brush object 17 is projected from upper limit opening 1a of a case 1. The rotation brush object 18 is formed in the point of this brush object 17 free [rotation] through the shaft 19. Gear-tooth brush 18a is prepared in the field where the rotation brush object 18 projects from the brush object 17, and pinion 18b is formed in the back end section of the brush object 17 in one.

[0011] The tip of the 2nd driving shaft 12 is connected with the back end of an arm 14 free [attachment and detachment] through the connection bush 13 inside the brush object 17, and the tip of an arm 14 is extended even to the point of the brush object 17. As shown in the point of an arm 14 at drawing 2, rack 14a is formed and pinion 18b has geared to this rack 14a. Next, actuation is explained. Case 1 peripheral face is grasped, if the circuit changing switch which changes the forward inverse rotation of a drive motor 3 and which is not illustrated is operated, motor shaft 3a of a motor 3 will rotate to an one direction (forward rotation), and rotation of this motor shaft 3a will make rotation counterclockwise drawing 4 and the 1st and 2nd ratchet vehicles 6b and 6c shown in 5 through the motor pinion 5, bevel gear 6, and sleeve 6a. If 1st ratchet vehicle 6b rotates counterclockwise, 1st ratchet pawl 7a will engage with 1st ratchet vehicle 6b, and the 1st eccentric cam 7 will be rotated counterclockwise. At this time, it is only sliding on the field of 2nd ratchet vehicle 6c, and 2nd ratchet pawl 8a does not transmit rotation to the 2nd eccentric cam 8.

[0012] Since the 1st driving shaft 11 which the 1st cam follower 9 carries out a straight-line reciprocating motion to the longitudinal direction (the vertical direction) of a case 1 through long slot 9a, and has been fixed to the 1st cam follower 9 is also followed if the 1st eccentric cam 7 rotates

counterclockwise as shown in drawing 4 , the brush object 17 connected at the tip of the 1st driving shaft 11 is also followed, and it reciprocates up and down. Since the 2nd eccentric cam 8 did not rotate at this time, the 2nd cam follower 10, the 2nd driving shaft 12, and an arm 14 have stood it still. For this reason, as shown in drawing 2 , pinion 18b will reciprocate with the brush object 17 in the condition of having geared to rack 14a of a quiescent state, and carries out both-way rotation. The rotation brush object 18 and gear-tooth brush 18a carry out both-way rotation with both-way rotation of pinion 18b. That is, gear-tooth brush 18a carries out a vertical reciprocating motion with the brush object 17, and carries out both-way rotation to coincidence with pinion 18b.

[0013] On the other hand, if a circuit changing switch is operated and it is made both-way rotation polishing, shaft 3a of a motor will rotate in the other directions (inverse rotation), it rotates clockwise, and shortly, 2nd ratchet pawl 8a will engage with 2nd ratchet vehicle 6c, and the 1st and 2nd ratchet vehicles 6b and 6c will rotate the 2nd eccentric cam 8 clockwise. At this time, it is only sliding on the field of 1st ratchet vehicle 6b, and 1st ratchet pawl 7a does not transmit rotation to the 1st eccentric cam 7. If the 2nd eccentric cam 8 rotates clockwise as shown in drawing 5 , since the 2nd driving shaft 12 which the 2nd cam follower 10 carries out a straight-line reciprocating motion to the longitudinal direction of a case 1 through long slot 10a, and has been fixed to the 2nd cam follower 10 is also followed, the arm 14 connected at the tip of the 2nd driving shaft 12 is also followed, and a straight-line reciprocating motion is carried out. Since the 1st eccentric cam 7 did not rotate at this time, the 1st cam follower 9, the 1st driving shaft 11, and the brush object 17 have stood it still. For this reason, as shown in drawing 2 , rack 14a will reciprocate with an arm 14 in the condition of having geared to pinion 18b, and carries out both-way rotation of the pinion 18b. The rotation brush object 18 and gear-tooth brush 18a carry out both-way rotation with both-way rotation of pinion 18b. That is, gear-tooth brush 18a is only both-way rotation in this case, and a vertical reciprocating motion is not performed.

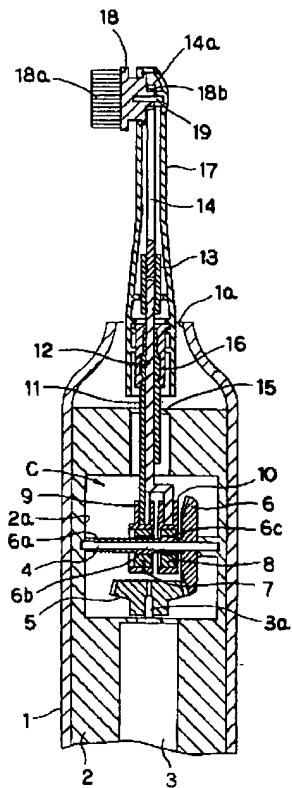
[0014] In addition, when the rotation brush object 18 may be formed in the brush object 17 free [attachment and detachment] and gear-tooth brush 18a is damaged by this, it becomes possible to exchange the rotation brush object 18.

[0015]

[Effect of the Invention] As mentioned above, by using it towards one of right reverse using a single drive motor according to this invention, choosing the rotation Since the case (single polishing of rolling polishing) where a gear-tooth brush only rotates, and the case (compound polishing of bus polishing and rolling polishing) where a gear-tooth brush carries out movement to which the straight-line reciprocating motion joined rotation can be chosen alternatively Toothbrushing according to a part can be performed more appropriately and can heighten the toothbrushing effectiveness.

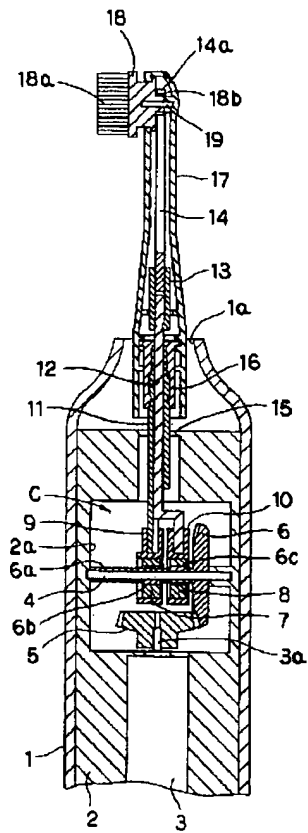
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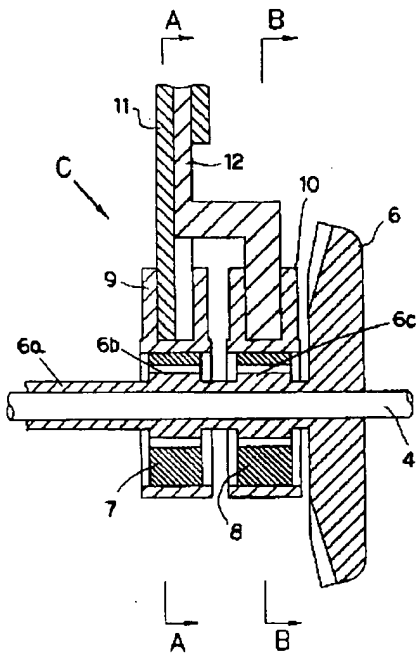
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Drawing selection | drawing 1



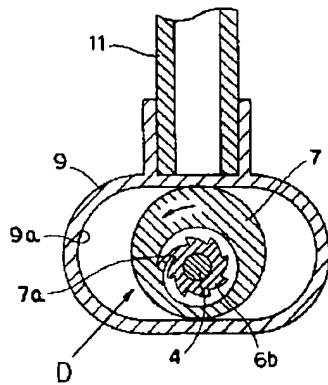
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Drawing selection drawing 3



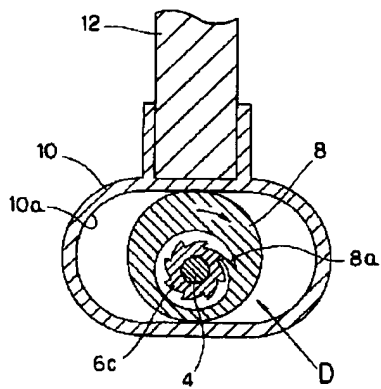
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Drawing selection drawing 4



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Drawing selection drawing 5



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